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ABSTRACTS OF TUBERCULOSIS

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REVIEW

Tuberculosis Among the North American Indians.—Report of a Committee of the National Tuberculosis Association, George M. Kober, M.D., Chairman, 1923.

This report was prepared by a committee of men long familiar with diseases among the Indians. It contains a condensed yet complete survey of tuberculosis among the North American aborigines, culled from history and extending back as far as the settlement of America by the white races. A previous report, based on inquiries and surveys made at government agencies, was submitted by Ales Hrdlićka in 1909, and another by the United States Public Health Service in 1912. The present report brings the matter up to date.

To those who like the writer were reared in the East, and from earliest childhood were filled with shame and indignation at our Indian policy, there is abundant confirmation of the belief that tuberculosis is one of the inevitable results of the inhuman, unintelligent and selfish treatment visited upon the aborigines. The report commends the many government officers who have striven for better things with niggardly appropriations. The Congress of the nation, on whom most of the guilt will always rest, is clearly blameworthy, by inference, in this report for the excessive toll of tuberculosis taken from the Indians in the past fifty years.

Does the red man show a special susceptibility to tuberculosis? The report does not make out a case for this; rather the statistics of different tribes go to prove that where the Indian has had a fair chance to be clean and well fed he reacts like the white man to tuberculosis. The disease is now diminishing. Hrdlićka assumed that there was greater susceptibility; yet, as it appeared that scrofula and tuberculosis were observed by early writers three hundred years ago when they prevailed but little among the Indians, it is evident that a change in their manner of life introduced new factors tending to increase the disease. For example, we note from the United States Public Health Survey of 1912 that the Cherokees in North Carolina had a lower mortality rate than the white or black races. Likewise in New York, North Dakota and South Dakota, low rates were found, ranging from 0.92 to 5.89 per cent. In Arizona the White River Apaches had 1.5 per cent, whereas the Navajos' rate was 14.6 per cent. The highest rates were from 15 to 23 per cent where the most insanitary conditions prevailed, coupled with alcoholism and the *peyote* habit.

The committee making the present report sent out, in 1920, in conjunction with the Bureau of Indian Affairs, a questionnaire to all Indian agencies, health boards and tuberculosis associations, concerning the present incidence of tuberculosis, the most prominent predisposing causes, methods of prevention in use, and recommendations. The summary of the replies discloses the fact that the mortality from tuberculosis had increased steadily from 1880 to 1913, from 23.6 per 1000 to 32.24 per 1000. Since 1913 a decrease has been observed, until in 1920 it was 22.33 per 1000. Records were inadequate before 1911, but the vanishing red man has ceased vanishing, and now the birth rate exceeds the death rate.

The work of prevention already done by the government in raising the standards of living for the Indians is making a real impression according to Kober. In the surveys recently made the latent cases found averaged 6.74 per cent, while the incidence of active tuberculosis was practically the same, 6.73 of those examined. Great need still exists for more hospitals for adults.

The committee concludes that the variations in prevalence of tuberculosis are too great to admit of the explanation of a special race weakness due to previous freedom from exposure. Instances of like variations among the white and black races are cited. This is particularly true since the great war. Food deprivation, with all the accompanying distress, suffices to account for the increased incidence.

No mention is made of the predominating types of disease found in the Indian race. The scrofulous cases or lymphatic tuberculosis of a severe form and at all ages are known to be characteristic of peoples recently brought in contact with tuberculosis. Acute tuberculosis is also commonly seen. The massive amount of infection borne by white races living under similar hard conditions must be remembered when comparing them with these primitive peoples. If one may agree in the main with the conclusion of the committee, there is yet something to be said for a pathological difference in the lesions. The fact that enlightened medical and nursing care is now being extended by the federal and state governments in an increasing degree brings hope for the gradual diminution of the mortality among the Indians. Recommendations are made for immediate provision for care and treatment of adults, the children already having received attention. Two or three sanatoria are needed, one a hospital for advanced cases. More nurses and increased salaries for the physicians are needed.

The report is a valuable reference work; for tables are appended giving the Indian population, vital statistics, and the successive reports of the Indian Commissioners for a period of years.

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ABSTRACTS

Treatment of Tuberculosis by Injection of Foreign Blood.—In certain forms of surgical tuberculosis, particularly bone and joint disease, the injection of small amounts of various animal bloods exerted a very favorable effect on nutrition. The method was of particular value in those cases in which the process was healing but the patient was not taking on weight. Blood was injected intravenously very slowly and with aseptic precautions. Ordinarily 6 injections were given, one or two weeks apart. To avoid anaphylactic shock several types of blood were used, as pig, sheep, ox and horse. A rise in weight during and after the injection was the usual result. The favorable effect is attributed to a stimulation of the hematopoietic function. At first a rapid destruction of erythrocytes occurred, followed by a return to more than normal.—*Ueber die Hebung der Ernährung heruntergekommener Tuberkulöser durch intravenöse Tierbluteinspritzungen, E. Kisch, München. med. Wchnschr., February 16, 1923, 199.*

Treatment of Surgical Tuberculosis with Hydrolysates of Homologous Tissues.—A nutritional factor is partly responsible for the localization of disease in certain regions. Resistance in those regions may be enhanced by bettering the nourishment to the part. Theoretically, the best results should be achieved by feeding or otherwise supplying material of the same sort that is being destroyed. It was found of advantage to treat patients with bone and joint tuberculosis by feeding to them hydrolysates of the bones and joints of animals, in which the hydrolysis had been carried down to the amino acid stage. Such preparations are called *Eatan*. Sixty-two cases were handled by this method, with 42 complete recoveries and 15 improvements. The treatment lasted 2 to 3 years, the patients receiving 5 cc. of the concentrated hydrolysate daily. Increased secretion, favoring sequestration, resulted, and in the majority of cases there occurred a marked increase in weight.—*Die Behandlung der sogenannten chirurgischen Tuberkulose mit Hydrolysaten aus tierischen Eiweiss und tierischen Organen (Eatan), R. Haff, München. med. Wchnschr., May 25, 1923, 661.*

Prognosis of Pulmonary Tuberculosis by X-rays.—Ordinarily, X-ray reports on pulmonary tuberculosis are not checked up as they are on fractures. If the roentgenologist makes a mistaken diagnosis and the patient is well after a year, no blame is attached to him and the physician in charge gets credit for a cure. If, on the other hand, he makes a mistaken negative diagnosis, and the patient gets worse, he naturally goes elsewhere for another X-ray report. In this study have been analyzed the findings during three and a half years at a soldiers' hospital, where there was the opportunity of following cases for three or four years. During this time 2,321 chest cases were examined and 2,574 stereoscopic plates made, of which 144 were cases of pulmonary tuberculosis. It is interesting to note that generally the X-ray findings of pulmonary tuberculosis have been in advance of the clinical. It is also noted that patients in whom the X-rays have shown no tuberculosis have been sent to a sanatorium and have returned after

about a year with a report of disease arrested. On comparing plates made before and after, no trace of tuberculosis was seen at either examination. Mottling is the earliest positive evidence. Simple intensification of the bronchial tree is certainly not an early sign of tuberculosis but may result from a former healed tuberculosis. When it runs up to the apices the note there is impaired. In no case followed has this simple intensification of the bronchial tree been followed by active tuberculosis. A careful study yields the following summary as to prognosis: A favorable prognosis is based upon (1) absence of abundant mottling, (2) presence of calcification at roots of lungs, or, better, in the parenchyma and (3) no diminution in size of heart. An unfavorable prognosis is based upon (1) abundant fluffy mottling, (2) absence of calcification and (3) diminution in size of heart. The last can be easily shown and is out of proportion to the wasting of other muscles.—*Prognosis in Tuberculosis of the Lungs from Examination by X-ray, A. H. Pirie, Amer. J. Roentgenol., May, 1923, x, 366.*

Prognostic Value of Diazo and Urochromogen Reactions in Pulmonary Tuberculosis.—The results of these tests on 328 patients in all stages of the disease are given. A positive diazo reaction is undoubtedly a very unfavorable sign and is met with in cases in which the clinical condition does not leave any doubt as to impending death. In general, patients with a positive diazo do not live more than six months; but there are, of course, exceptions, and this should be taken into consideration when a prognosis is given. A persisting positive urochromogen reaction must be regarded as an unfavorable sign. The duration of life of patients with a positive urochromogen reaction, under good climatic and dietetic conditions, can be figured as only a few years. Transitory urochromogen reactions should always be regarded as a warning sign that the condition may become aggravated at any time; but a marked improvement in a few cases has nevertheless been noted.—*Die klinische und prognostische Bewertung der Diazo und Urochromogenreaction bei Lungentuberkulose, K. Lemmens, Ztschr. f. Tuberk., March, 1923, xxxvii, 423.*

Granular Forms of Tubercle Bacillus and Clinical Prognosis.—The Knoll double staining method reveals all the present known forms of the tubercle bacillus. As a result of these studies the majority of cases, in the later examinations, had only the Much forms. Rhonchi also became less numerous and finally disappeared, only to reappear with the return of Ziehl forms of bacilli. Patients with acid-fast bacilli in the sputum always had râles, even after prolonged cures; while in most cases with only gram-positive forms clinical cure resulted. When Much forms were found first and later acid-fast forms without clinical change for worse, it is possible that small foci have broke down and changed the microscopic but not the clinical picture. However, an aggravation with disappearance of acid-fast and replacement by gram-positive forms never occurred. Much forms predominate over Ziehl forms in the first stage, while in the third stage they are not frequent. They also indicate a better clinical prognosis. The Knoll method is: (1) A tube of Grübler stains containing two dyes (names not given) and resorcin are dissolved in 2 cc. of absolute alcohol, diluted with 20 cc. of distilled water (this solution keeps 8 days). (2) The specimen is stained cold for 24 hours (or warm 5 minutes); the latter gives, however, poorer results. (3) Treat with Lugol's solution 1 minute. (4) Differentiate with 2 per cent hydrochloric acid in 70 per cent alcohol until smear appears blue. (5) Decolorize with acetone until preparation appears red. (6) Rinse with absolute alcohol to remove acetone. Study in artificial light. Ziehl forms are red, transition forms pale rose with blue black granules, and Much forms pale blue or colorless. Intracellular individual granules are blue-black or partly dark red. The cells are rose red, and other gram-positive bacteria violet, partly irregularly stained. Cocci are larger than Much granules.—*Granuläre Form des Tuberkulosevirus und klinische Prognose, A. Peter, Beitr. z. Klin. d. Tuberk., June, 1922, lii, 70.*

Causes of Decline in Tuberculosis Mortality.—Organized effort against the disease is responsible in large measure for the decline of mortality in recent years. It has emphasized personal hygiene on the preventive side and has restored health to many on the curative side, through diffusion of information concerning the disease, its causes and treatment. The sharp decline just prior to the campaign period came as a result of the general improvement in the economic and industrial environment of man, and such improvements the antituberculosis campaign has always been at pains to point to as significant. The future is bright for a continued decline. Economic gains once made are never permanently lost and, with the continued acquisition of better economic surroundings (carrying with them more leisure, more education, less strain, shorter hours of work, etc.), the wage earner is ever arming himself against tuberculosis.

This spread of education makes the antituberculosis campaign much more effective. "The antituberculosis campaign itself is an index of the higher intelligence and the social conscience which characterize an advanced civilization."—*Causes of the Recent Decline in Tuberculosis and Outlook for the Future, Statistical Bulletin, Metropolitan Life Insurance Company, June, 1923, iv, no. 6, 1.*

Classification of Pulmonary Tuberculosis According to Bacilli in Sputum.—The classification of pulmonary tuberculosis, dependent upon the elimination of bacilli, is of great significance practically. Until the present time the terms *open* and *closed* have been retained. A preferable term would be *infectious* for the "open" cases, although in this class not only the continual bacilli excretors but also the intermittent or facultative ones should be included. Any case in which a tuberculous focus communicates with the bronchi should be considered as infectious tuberculosis. Among these are to be included all cases in which bacillus excretion has not yet set in, or in which it has stopped, but in which, according to clinical findings or the characteristic general appearances, this can occur.—*Zur Frage wissenschäftlicher Berechtigung der Einteilung von Lungentuberkulosen in "öffene" und "geschlossene" Formen, A. Winkler, Wien. klin. Wchnschr., August, 1922, xxxv, 713.*

Tuberculosis in India.—The study of the contrast of disease in different parts of the world is extremely interesting. The clinical distinctions between the effects of the same microörganisms on the inhabitants of different countries are sometimes partly due to actual difference in climate, but much more are they due to racial differences. Ultimately, the contrasts in clinical manifestations are usually due to variations in external surroundings acting on a race through several generations. This paper is entitled *Tuberculosis in Indians* rather than *Tuberculosis in India* in order to emphasize the racial rather than geographical distinction. We know from ancient Hindu and Mohammedan literature that tuberculosis has existed in India from very early times. Yet it is the general impression that the prevalence of the disease has increased greatly in the last forty years, especially in rural areas. Statistics are limited because the few great cities, which alone can show trustworthy statistics, have such large floating populations. The main causes of the recent increase are considered to be the growing industrialization and increase of means of communication. Increase of railways and cheap travel brings the country folk in large numbers in contact with city folk, among whom infection is high and sanitation low. Lankester attributes prominence to the effects of humidity, but nevertheless patients do well in the Himalayas during the monsoon months, although the rainfall in the hills exceeds that of the plains. Temperature is probably a more potent factor. Heat, wind, and dust are all deleterious, and in Northern India from April to June all three go together. The heat is most intense, and in the daytime the hot wind strikes the face like a blast from a furnace, rendering open air treatment an absurdity. A patient on the plains who has done well during the cold weather will barely mark time through the hot season unless he goes to the hills, while one who has made little progress will certainly become worse. In the town of Lucknow tuberculosis causes 17.8 per cent of all deaths, about twice the proportion in the United States, which is 8.7 per cent. Among the Hindus the deaths among males and females are about the same; among Mohammedans there are twice as many female as male deaths. In Calcutta the rate among Mohammedan women is 5.8 per cent per 1000, among the Hindus 3, while for women in England and Wales it is between 1 and 1.5 per cent. The reason for this appalling mortality among Mohammedan women is obvious to one who knows their social life, being due to their restriction to the zenana with its closely confined and unsanitary conditions. The disease has been seen to run through a zenana and destroy most of its inmates in a few years. The unsanitary conditions prevalent among Indian people have been dealt with by Lankester and Powell; pavement, floors and courtyards spattered with sputum, also the walls of some of the rooms and even the bedsteads and bed clothes, while the poorer classes often sleep huddled together on the floor. Trustworthy statistics regarding Indian mortality are obtainable from the army records. The special liability of the Gurkhas and Pathans to pulmonary tuberculosis has been noted and is probably due to their primitiveness as a race and remoteness from civilization, with its attendant lack of immunity, acquired or otherwise. Clinically, Powell has noted that tuberculosis in the natives of India is more acute and rapid in its course than in the European, and Collis compares it to the tuberculosis of infant life. It might be added that among the Irish the type of disease occupies an intermediate position. The Irish are less industrialized than the British. Tuberculosis in the Indian usually begins with fever and cough, and must be differentiated from typhoid fever. The

hakins have a saying that fever lasting more than forty consecutive days is due to tuberculosis. The hilum type of disease is frequent, as is also glandular involvement, either mesenteric or mediastinal. Most of these cases appear to be of the human type, bovine tuberculosis being a negligible factor in India. It is the rule, rather than the exception, to find some tenderness about the umbilicus and often there is a lump, especially to the right and below. Another striking feature is the great frequency with which the disease first evinces itself in the puerperium or during lactation. Some of the most acute cases have started soon after childbirth. There must be some biological reason for this relation. The later in lactation the disease becomes manifest the better the outlook. However, the average Indian woman is not allowed sufficient time between pregnancies to recuperate from any severe debilitating disease. Also, the average muscular tone is poorer than of those in more bracing climates, and gastric atony is common. The same general features appear to characterize the disease among the Arabs of Mesopotamia and the Persians to a greater or lesser degree. Regarding civilization, it may be added that the ancient culture and activities of the people of India cannot have been in any way comparable to modern industrialization and activity, even if compared with the Britain of two hundred years ago. When it is attempted, as now, suddenly to introduce these new conditions into India an increased tuberculosis mortality is inevitable, but a similar process of adaptation and development of immunity will doubtless in time develop.—*Tuberculosis in Indians, C. A. Sprawson, Tubercle, August, 1923, iv, 31.*

Factors in Female Phthisis Death Rate.—Vital statistics for England and Wales show that the female deaths from pulmonary tuberculosis are less than the male deaths under 5 years of age. In the quinquennia, 5 to 9 and 10 to 14, however, the total phthisis mortality in females rises definitely above that in males. The female mortality keeps above the male up to the age of 30, after which, though the male population is now decidedly smaller than the female, the male phthisis mortality becomes and remains the higher. These and other statistics show that the age periods of female life which are characterized by the preparation for and the assumption of full sexual maturity are dangerous periods as regards pulmonary tuberculosis; that females are, at least in such a population as that of England and Wales, more liable to die of phthisis than are males during these age periods, and that the risk from phthisis is, at these times, greater than the risk from other causes of death. This risk seems to disappear to a large extent at or shortly after the menopause, while it increases for males with advancing age. Similar variations are noted by other authors, who offer explanations that menstruation, pregnancies and lactation undermine the resisting powers of women, that industrialization of women plays a part, and that women do not bear hard work under deleterious conditions as well as men. It is pointed out, however, that the female phthisis death rate becomes relatively less in later life, when women are less likely to be supported by the work of fathers and husbands than in earlier life. As far back as 1851–1860, in Welsh countries where the population was then mainly agricultural, the female phthisis deaths per 1,000 were higher than the male up to 20 years of age, a fact that rules out industrialization of women as the only cause. In modern times, however, industrial considerations are important. But the fact that the stress of occupation has a more fatal influence on the phthisis of young females than of young males suggests that here, too, factors other than occupational ones, and acting especially or exclusively on the female sex, must come into play. In the average population infection is usually widespread, and we must consider chiefly factors that act by favoring reinfection, either exogenous or endogenous in origin, in persons already "allergic" to tubercle bacilli. The young girl is more closely bound to the home than the young man, employment outside the home is usually in a domestic or indoor position, and she is more intimately exposed to sick relatives or parents. These factors must be considered, but they do not entirely account for the great contrast in the phthisis mortality of the sexes which occurs at the time of preparation for and assumption of sexual maturity, the child bearing period, and the period of the cessation of reproductive activity at the menopause. There can be no doubt that pregnancy, childbirth and lactation are fraught with danger to one infected with tuberculosis. In a recent survey of 374 cases of married women who had died of pulmonary tuberculosis, pregnancy was a factor in the inception or aggravation of the disease in 64, or 17 per cent; in another series of 120 cases, the figure was 20 per cent; and in the two series there was a history of intimate home contact with advanced cases in 50 and 65 per cent, respectively. Menstruation is also known to impose a strain on tuberculous women; likewise puberty, when the fires of life are at full blast in preparation for the future of the race. The

endocrine system seems definitely related to some of these phenomena, but this field remains largely unexplored. The closer association of young females with the home is calculated to affect their opportunities for acquiring resistance. The dangers of frequently repeated and massive infection, when the family includes an open case of tuberculosis, and, on the other hand, the absence of immunizing subinfections, when the household is entirely free from the disease, are evident. The result is likely to be either severe and fatal phthisis through mass infection, or else almost complete indemnity from infection, entailing a liability to attack when the sheltered conditions of home life are exchanged for the outside world. These circumstances are more likely to affect the female than the male, at least in rural areas. In spite of increasing industrialization of women, it is safe to assume that the female phthisis mortality will remain higher than the male during the reproductive age periods of life.—*The Reproductive Mechanism as a Factor in the Female Phthisis Death Rate, S. L. Cummins, Tubercle, June, 1923, iv, 385.*

Tuberculosis Problem in Massachusetts.—This is an excessively urbanized commonwealth. Of four million population the census bureau credits only 100,000 as farmers, an insignificant proportion. Thus, it is a problem of city conditions. There are 14 cities with population between 50,000 and 100,000, 8 or 9 of 100,000 upward, and 10 or 12 between 40,000 and 50,000. The problem in the smaller towns is of special importance because neglected in earlier years. Three fundamentally important matters are early reporting of cases, bovine tuberculosis eradication and general policy of dispensary work. The state has invested about a million dollars in permanent tuberculosis institutions and their annual maintenance is as much again. The counties have invested nearly three million and the cities large amounts, a total of six million. It is especially on the public health nurse and physicians that the obligation rests to see that there is a good return. At present, too many cases have reached an advanced stage when admitted to sanatoria and this gap must be eliminated. Bovine tuberculosis has spread, not only among cattle but also hogs, the percentage of the latter condemned for this reason having increased from 1 to 10 per cent in the decade from 1902–03 to 1912–13. It is estimated that from 5 to 15 per cent of tuberculosis in children is bovine. Also, there is at present no adequate provision for the considerable group of nonpulmonary cases. It is recommended to set aside an institution for the treatment of joint, skin and lymph node tuberculosis, using the Rollier system of sunlight exposure. The only place in Massachusetts where it is now applied to adults is Tewksbury; at Westfield it is used on children. There has also been a growth of interest in summer camps, but they are still far too few. Children below par should be segregated for special treatment. There has also been a growing interest in examination clinics, for which the State Tuberculosis League deserves much credit. The league has been able to put a number of field nurses in the smaller communities, which hitherto have been neglected. There has likewise been an awakening as to the significance of child health. Fifty or sixty towns have made applications for clinics, and there are 3000 children waiting to be examined, many of whom may be reasonably expected to have tuberculosis. The department of health has finally worked out a follow-up scheme which is not too complicated or too much of an interference with private affairs, the details to be carried out by the nursing force of the local department plus the nurses of the tuberculosis league and volunteer assistance from various nursing associations, the whole being under the supervision of the state department of public health. There are now on record about 30,000 cases to whom this work will apply.—*The Tuberculosis Problem in Massachusetts, E. R. Kelley, Boston M. & S. J., June 28, 1923, clxxxviii, 1041.*

Medical Control of Tuberculosis.—Any plan to control tuberculosis must have for its object the prevention of new infections or of activation of latent infections, and the cure and handling of existing cases. It is one of the few diseases the treatment of which is properly a public function. The prevention of infection or activation must be on a broad basis, for active tuberculosis is usually secondary to some other disease, overwork, worry, dissipation, irregular habits, faulty nutrition or bad housing. All well founded agencies have built on these principles, and have for their scheme of work the education of the public in the cause and transmission of the disease, the predisposing factors and the necessity for early treatment. These facts are given by printed literature, motion pictures and lantern slides, lectures, clinics, sanatoria and social work. One of the functions of official agencies which sometimes meets with criticism is that of the accurate reporting of cases. This is required in almost every well-organized country. It helps to hold the patient in check and restrain quackery and *Wanderlust*. Clinics are deemed necessary only as a means of

demonstration and should be conducted under the auspices of the local profession. The egotism of modern specialism has led the physician to the belief that only a specialist can make an early diagnosis, whereas the average practitioner, with more confidence in himself, should be able to do so in at least 75 per cent of cases. It should be remembered by the enthusiasts that the present rapid decline in death rates from tuberculosis began before any organized effort to control. Sanatoria should be operated on a plan of close coöperation with physicians, to act as a clearing house, as well as to serve the public. They should be open at all times to physicians for study, and be properly equipped for this. The ideal plan must include physicians, able and willing to do conscientious work and with ambition to relieve physical suffering and mental anguish. —*The Prevention and Control of Tuberculosis as it Concerns the Medical Profession, H. Boswell, J. Am. M. Ass., October 13, 1923, lxxxi, 1250.*

Social Aspects of Tuberculosis.—Tuberculosis is one of the great killing diseases, being responsible for 10 per cent of all deaths. It is the penalty of our imperfect civilization, and is concerned with so many factors of life that there is much to learn. About 50,000 die yearly in England from this cause, or the equivalent of a county borough. Wurtzen, of Denmark, has estimated the mean duration of life for adults as 35.9 months, for children under 15 years, 11.9 months, and for sanatorium cases, 56.1 months. The mortality rate in England has been declining for one hundred and fifty years, probably due in large part to improved standards of living, housing, feeding and clothing. It is a great temptation to regard special measures in dealing with it as the chief cause of this reduced mortality, but careful statistical studies do not bear this out. Moreover, the fall in death rate is not constant. It is rising in Germany and Russia and some primitive communities, and it rose very definitely in women during the war, probably because of their entry into factories in large numbers. The question of how a given case contracted tubercle is difficult to answer, but there is no doubt that close and prolonged association favors infection, while a debilitated physical state reduces resistance. Tuberculosis is without doubt largely an industrial disease, the recorded mortality in men from 45 to 75 being twice that in women of the same age. Still, it is also a disease of the young whose work is still to be done, and not of the old, whose best days are over. It has attacked men and women of great brilliancy and attainments. Sanatoria are of value, not only in aiding the cure or alleviation of the disease, but also in checking the spread of infection, and in their educational influence. Children showing evidences of tuberculosis need a long period of efficient treatment to establish lasting immunity. The diminished number of cases of disease is especially noticeable among children. There is a general upward trend in the personal habits of the people; for example, far less promiscuous spitting and greater cleanliness are now observed. The school medical and nursing services have had an effect. There is less drinking of alcohol. Food and cooking are better, and labor saving devices have lessened drudgery. A great present need is better after-care machinery and a closer linking of sanatorium with dispensary. The question of the best trade or employment for an expatient is important. A sheltered trade is generally found only in special colonies. The creation of an organization like the Framingham Health Demonstration is urged. —*Discussion on the Social Aspects of Tuberculosis, Jane Walker, Brit. M. J., September 22, 1923, no. 3273, 512.*

Milk and Public Health.—Cow's milk for human consumption has been the subject of controversy for many years. In view of legislation, wise and unwise, overzealous and incomplete, it is the privilege of our profession to demonstrate the value of pure milk and to point out the dangers of impure milk. Theobald Smith, in 1898, first recognized the difference between the human and bovine types of tubercle bacilli. The possibility of the infection of man with the bovine bacillus was not recognized for several years and was at first denied by Robert Koch. Differentiation between the two types of bacillus may be made partly by morphology and cultural characteristics, but more surely by animal inoculation. In proper dosage the bovine bacilli generally kill a rabbit within two to five weeks, whereas the human bacilli produce a mild and slow disease, occasionally failing to kill. The loss from tuberculosis in the livestock industry amounts to probably $40,000,000 a year in the United States. The tuberculous cow, as well as being a menace to other cattle, is the commonest source of infection to swine. Tuberculosis in cattle may give no indication of its presence by external symptoms. The tuberculin test, subcutaneous, intracutaneous or ophthalmic, is the most reliable and practicable way of discovering the presence of infection. The intracutaneous, applied in the region at the base of the tail, is the most convenient and most frequently employed. In a study of both human and bovine tuberculosis, the

British Royal Commission of 1911 concluded that "there can be no question that human tuberculosis is in part identical with bovine tuberculosis and is caused by bacilli which, in every respect, are identical with the bacilli which are the cause of tuberculosis in cattle." Park and Krumwiede found nearly 11 per cent of all forms of tuberculosis, except pulmonary, to be due to bacilli of the bovine type. As a preventive measure it may be stated definitely that pasteurization, properly performed, will undoubtedly remove all danger of transmission of tuberculosis through milk. *Summary:* Milk-borne tuberculosis remains a definite and grave menace, particularly to children. Certification of milk does not entirely remove this danger. The complete eradication of bovine tuberculosis is a goal to be worked for, but its attainment is not in the near future. The proper pasteurization of milk undoubtedly removes the danger from bovine tuberculosis, as does boiling. The milk from which subsidiary food products are taken or manufactured should be subjected to the same precautionary measures as milk intended to be sold or consumed in its original form.—*Milk and The Public Health, J. Garland, Boston M. & S. J., October 4, 1923, clxxxix, 460.*

Human Tuberculosis Due to Avian Tubercle Bacilli.—A report of 2 cases with septic reaction and urinary turbidity. The urinary sediment contained polymorphonuclear leucocytes and a large number of acid-fast rods. The sediment did not affect guinea pigs but chickens developed tuberculosis. It seems that avian bacilli prefer to localize in the kidneys of man. One case was treated successfully by avian tuberculin, the other healed spontaneously. Infection in chickens is through the digestive tract and the infection is spread by the feces. In man the transmission is by the egg, since the bacilli are not killed by boiling the egg. Careful raising of healthy chickens obviates the danger of infection to man.—*Tuberkulose des Menschen, hervorgerufen durch den Erreger der Vogeltuberkulose, (Bacillus tuberculosis avium), G. Joannovic, Wien. med. Wchnschr., January, 1923, lxxiii, 22.*

Against Droplet Infection.—Experiments were performed to test whether mouth droplets were of significance in spreading infectious material. The droplets were examined with the binocular lens. Measurement of the air speed during speech, by means of the Gutzmann-Wethlop apparatus, revealed that droplets which were sprayed were formed only in the front parts of the mouth. Therefore, only materials from disease localized here, or such agents as are carried forward by the saliva or are freed from the posterior parts of the mouth and larynx and are mixed in sufficient amounts with the sputum, are of importance. Mouth droplets are formed only during consonant speech, vowels playing no rôle in this. During disease of the gums infectious mouth droplets are spread. A liberation of material containing bacteria from the tonsils and deeper parts of the pharynx, larynx and vocal cords seems unlikely. The moist simple catarrhs of the upper air passages lead to an increased dissemination of mouth droplets. Screaming infants, suffering from pulmonary diseases, rarely spread them by mouth droplets. Mouth droplets may be of significance in the spread of exanthematous diseases of unknown etiology, in which are found changes in the mouth during the prodromal stage.—*Versuche über beim Sprechen verschleuderte Tröpfchen, W. Strauss, Ztschr. f. Hyg., 1922, xcvi, 27.*

Tuberculosis and Pregnancy.—The relation between tuberculosis and pregnancy has never been clearly defined because this question has been considered only from the viewpoint of the internist or obstetrician, and to a great extent the figures obtained have been too scanty. Tuberculosis rarely causes abortion. Premature birth is more frequent than abortion. Termination of pregnancy is frequent in lethal cases (due to carbon dioxide overloading of the maternal blood). Tuberculosis of the placental insertion can occur, as well as tubercle bacilli in the placenta and in the umbilical blood, liver and the lymph nodes of the newborn. Intrauterine infection of the child is possible, but rare. In the majority of the cases the infection occurs after birth. Artificial termination of pregnancy for hygienic reasons is not advised, since in the most unfavorable cases healthy children are born in 30 to 35 per cent. In how far the pregnancy has an unfavorable influence upon the mother is variously discussed. Internists are in favor of abortion while obstetricians oppose it. It is not proved that the mortality from tuberculosis during pregnancy and the puerperium is increased. Terminal phthisical processes do not justify abortions. The Turban scale is not suitable for judging this question, since it only considers the extent and not the intensity of the disease, and also does not reflect the anatomic form of the disease. It is important to know whether we are dealing with a cirrhotic, infiltrative or softening caseating type. Besides the constitutional condition of the pregnant woman the effect of termination in the early months must be considered. As a result of

this procedure, not only can the nutrition be affected, but infectious material can be spread to the healthy parts of the lungs. Of the complications, laryngeal tuberculosis is to be looked upon as the most unfavorable prognostically, yet in its presence it is preferred to terminate the pregnancy toward the end to save the child. Subfebrile temperatures are not considered unfavorable, but high fever is. Hemoptysis is serious. Positive bacillary findings are also unfavorable prognostically. Only prolonged observation and not a single examination can be considered of service. *Conclusions*: 1. Terminal and nonprogressive cases are no indication for the termination of pregnancy. 2. Gravidity, delivery and childbed can cause a flare-up and progression. 3. The outcome of the abortion is dependent upon the severity of the disease and the period of gravidity. Termination at the beginning of the fourth lunar month and in the Turban I stage gives favorable results, but the prognosis is also dependent upon the anatomic character of the disease. Laryngeal tuberculosis indicates termination in the first months. 4. Abortion in the second half of gravidity and especially in the later lunar months is no less dangerous than birth at the normal time.—*Tuberkulose und Schwangerschaft, H. Peham, Wien. klin. Wchnschr., October, 1922, xxxv, 781.*

Marriage, Pregnancy, Parturition and Tuberculosis.—The importance of the question as to whether a tuberculous woman should marry is obvious, yet emphatically opposite opinions by equally eminent authorities are met with in the literature. One is finally led to conclude that, as often happens in controversies, both are right, and both are wrong. Ward has been collecting evidence in the form of clinical observations and detailed inquiries, for about three years, as to the effects of these factors on both patients and their children. Only major (manifest) tuberculosis is considered. The chief difficulties are to decide whether the deterioration in health is due to an exacerbation of tuberculosis or to some other cause. *Marriage without pregnancy:* Of 125 tuberculous women, 60 per cent were unaffected, 26 per cent better, 14 per cent worse. Bearing in mind that 15 to 20 per cent of patients may be expected to deteriorate in any period of one or two years, these results would indicate, if any, a favorable effect of marriage on tuberculosis. *Pregnancy:* Out of 423 pregnancies in 237 tuberculous women, 53 per cent had no effect, 16 per cent improved the patients, 31 per cent made them worse. Unluckily it is impossible to consider pregnancy apart from parturition. *Parturition:* Out of 442 labors in 240 patients, 32 per cent left the patient unaffected, 19 per cent made her better, and 49 per cent worse. The onset of disease occurred after parturition in 17 per cent of the patients, of whom nearly one-half died. Apart from these cases, only 2 per cent of women died as the direct result of an exacerbation caused by childbearing. Sometimes we find a patient better during pregnancy and worse after confinement; less often the reverse. *Miscarriage:* Of 31 cases investigated, 14 (47 per cent) had no effect, 1 (3 per cent) improved, and 16 (50 per cent) made them worse. Thus the value of induced abortion in tuberculous women seems very questionable. *Lactation*: Out of 331 cases investigated, in 197 the mother breastfed the child for a period of variable duration, and in only 2.3 per cent did this appear to be detrimental to her. A woman too ill to suckle is generally unable to do so, and, while lactation may be exhausting, artificial feeding, especially in the early months, is often more so. *The children:* Of the offspring, 372 were traced and 290 investigated personally. Of these 45 per cent were negative, 34 per cent tuberculous, of whom one-quarter died, and 21 per cent suspects. A comparison of those breastfed and bottlefed showed an insignificant difference. *Summary:* A tuberculous woman loses nothing by marriage alone. If she is in any way affected, she is twice as likely to improve as to deteriorate. Pregnancy and parturition are likely to make her worse. There is about a 50 per cent chance of this as opposed to a 20 per cent chance of improvement. The children are seven times as likely to be tuberculous as those of healthy people. As to advice, patients who ask for it rarely take it unless it coincides with their wishes. The best way to prevent an undesirable union is to procrastinate. Each case, however, must be considered from all points of view. The chief risk is to the children and this should be emphasized. A woman of marriagable age with major tuberculosis should not bear children. As to lactation, if milk is available it is wise for a tuberculous woman to breastfeed the child for six weeks certainly, longer in many cases, but never longer than eight months, and always with precautions if she is infective.—*Marriage, Pregnancy, Parturition and Tuberculosis, E. Ward, Lancet, September 15, 1923, xxv, 557.*

Influenza and Pulmonary Tuberculosis.—Answers to the following questions were sought: To what extent are individuals with manifest pulmonary tuberculosis susceptible to influenza; how are individuals with manifest pulmonary tuberculosis in-

fluenced by influenza; can influenza occasion pulmonary tuberculosis in previously healthy people? The past reports are contradictory and confusing. Especially striking is the repeated observation that sanatorium patients were little affected while the personnel were markedly affected by influenza. The absence of danger of transmission during the incubation period and the stability of the infectious agent suffice to explain the enigmatic spread of the disease. The infectiousness of influenza seems to be identical for the consumptive and the healthy. The pandemic of 1889–1890 gave the impression that consumptives were, as a whole, unfavorably influenced by an intercurrent influenza. The new observations seem to contradict this. In the sanatorium Orup it was noted that influenza was serious to a case of actual pulmonary tuberculosis, the pneumonia tending to be fatal. Of 567 patients, no less than 188 (33.2 per cent) died, regardless of whether the patient was an early case under favorable conditions or whether he was immediately given all attention with the onset of the influenza. The action of the influenza was always variable upon a manifest pulmonary tuberculosis, probably depending upon the more or less virulent character of the influenza virus. In the more advanced cases the influenza was always of grave consequence Progressive lung changes almost without exception were fatal. Individuals with less advanced pulmonary tuberculosis were not so seriously affected by the influenza. Epidemic influenza could always cause a pulmonary tuberculosis to assume malignant proportions. Influenza was a danger not only to the manifest case of pulmonary tuberculosis but also to latent cases. Quarantine and isolation of the cases are thought best to reduce the seriousness of influenza.—*Das Problem Influenza-Lungentuberkulose und damit zusammenhangende Fragen, T. Stenström, Beitr. z. Klin. d. Tuberk., September, 1922, liii, 1.*

Carbon Monoxide as Predisposing Cause of Pulmonary Tuberculosis.—A man, aged 38, suffered from morning headache, anorexia, dyspnea on exertion, and lassitude. For ten years he had lived in a bedroom where a distinct odor of coal gas was detectable. This was identified as the cause of his symptoms. He subsequently developed pulmonary tuberculosis. From the observation of a large number of similar cases it is concluded that the inhalation of coal gas, even in very small quantities, continued for a considerable period, may be a predisposing cause of tuberculosis. The action of carbon monoxide as a constituent of coal gas is considered. A sample of air was taken from a bedroom in which there was a slight escape of gas. An empty oxygen cylinder, the valve open, was left in the room over night, and early in the morning a foot pump was placed at the level of a sleeper's head and the air of the room pumped into the cylinder to a pressure of 100 lb. per square inch, and the valve closed. This air was analyzed and the conclusion drawn was that when it is impossible to detect the presence of coal gas in a room by the sense of smell, the amount of carbon monoxide present may be as much as 0.02 per cent, and that in many instances 0.01 per cent is present. The blood of an average man is capable of absorbing 600 cc. of either oxygen or carbon monoxide, when it is said to be saturated. If both gases are present in the inhaled air the hemoglobin of the blood will combine with carbon monoxide in preference to the oxygen, the ratio being 200 of the former to 1 of oxygen. The amount of air breathed per minute when a man is at rest is 7 litres, and of this 5 litres reach the blood, so that, if the air of a room contains as little as 0.01 per cent of carbon monoxide, then 0.5 cc. of this gas will reach the blood per minute; and, assuming that all this is absorbed in one hour the blood will absorb 30 cc. and become 5 per cent saturated, and in eight hours will become 40 per cent saturated. Only three-sevenths of the carbon monoxide which reaches the blood is fixed by the hemoglobin; hence in eight hours the amount of saturation would be 17 per cent. This is quite sufficient to give rise to symptoms of headache, dyspnea, anorexia, lassitude and, after some months, anemia. In consequence of this there may be a distinct inhibition of phagocytosis and a lowering of the resisting power of the mucous membrane and epithelial lining of the bronchi to the invasion of tubercle bacilli.—*Carbon Monoxide, a Predisposing Cause of Pulmonary Tuberculosis, E. Hazleton, Brit. M. J., October 27, 1923, no. 3278, 763.*

Calcium and Tuberculosis.—The observations that lime workers rarely develop tuberculosis and that tuberculous lime workers do well, as has been noted in other countries, was corroborated in the Netherlands. Experiments on guinea pigs and rabbits, in which lime inhalations were used in infected animals, yielded questionable results. This negative animal experimentation is attributed to the acute character of the tuberculosis in these animals. An attempt to produce a chronic tuberculosis in rabbits by inoculating tubercle bacilli suspended in oil did not lead to practical results, since many of the animals developed infarcts tending to ulcerate in the lungs. Unfavor-

able by-effects of the lime dust inhalations were not seen. If it is desired to treat chronic pulmonary tuberculosis in man with lime, it is most active when given by intravenous or intratracheal injection, or by inhalation. The latter method, especially, is efficient and easily performed. Lime dust inhalation will favorably influence chronic pulmonary tuberculosis.—*Kalkstoff und Tuberkulose, S. Poliakoff, Dissertation, Amsterdam, 1922, Abstract from Zentralbl. f. d. ges. Tuberk.-Forsch., November, 1922, xviii, 518.*

Apical Infection.—Since the higher incidence of apical tuberculosis does not exist in children, the disposition or unusual opportunities for exposure must arise during the change from childhood to adult life. The presumption of a special disposition of the lungs is unnecessary, since neither aerogenic or hematogenic infection of the apices is proved, nor is either possible. Only when older lesions are seated in the apices is there a disposition for inhaled dust and tubercle bacilli entering the lung by way of the blood stream. An explanation for the appearance of a special apical disposition, initially toward the eighteenth year, is not to be found. On the contrary, the apex is unusually exposed to infection, since in the whole area surrounding the lungs tubercle bacilli are present only in the neck region, specifically, in the neighboring deep neck lymph nodes. One way for the entrance of the tubercle bacilli into the apical pulmonary tissues is through the ever-present adhesions. Among cultured people the numerous inflammations are the cause of the existence of such adhesions, which originate from the early injuries due to tooth-shedding, probably one of the most frequent causes of inflammations in the human body. To try to combat the predisposition is hopeless, since it is not clear what must be actually combatted. Good treatment of the teeth, tonsils, etc., will prevent points of entry for the tubercle bacilli into the pulmonary apices. For endogenous reinfection the hematogenous route from an unknown focus in the body and the lymphogenous route from the neck lymph nodes are of importance, while for exogenous infection only the aerogenic route is of moment. Only when the tubercle bacillus lodges first in the apices will tuberculosis develop there.—*Die Exposition der Spitze der Lunge, D. Reinders, Beitr. z. Klin. d. Tuberk., November, 1922, liii, 161.*

Clinical Types of Tuberculosis in Infancy.—Tuberculosis during the first year receives especial emphasis. Two complete clinical histories, illustrative of the types described, introduce each of the main topics presented, the cases being autopsied patients at the Babies' Hospital, New York. *Type I: General miliary tuberculosis:* This condition should be suspected in any infant who persistently does badly without other assignable cause; cough and continued loss of weight being the symptoms which should arouse greatest suspicion. The course of such cases is rapid, death occurring within a few weeks. In the majority, tubercle bacilli are not found in the sputum. In infants under two years of age, a tuberculous bronchopneumonia and tuberculous meningitis are in most instances part of a general miliary tuberculosis. *Type II: Tuberculous bronchopneumonia:* In the two cases of this condition, miliary tubercles were found in the lungs, liver, spleen, kidneys, peritoneum, mesenteric nodes, and elsewhere. Cavities often form in the tuberculous pneumonia of young infants. Tuberculous intestinal ulcerations may be present with or without signs. The younger the infant the less the likelihood of a tuberculous process confining itself to the lungs. *Type III: General miliary tuberculosis with focal lesions in the meninges; tuberculous meningitis:* Tuberculous meningitis terminates about 40 per cent of all cases of tuberculosis in children under two. *Type IV: Tuberculous peritonitis:* Children are infected far more commonly by the human than by the bovine type of tubercle bacillus. The authors quote Park and Krumwiede's estimate that bovine tuberculosis causes less than 10 per cent of the total deaths in tuberculous children. The majority of tuberculous infections of the cervical lymph nodes, of the alimentary tract and of the peritoneum are caused by the bovine type of bacillus.—*Clinical Types of Tuberculosis in Infancy, M. Wollstein and F. Bartlett, Arch. Pediat., July, 1923, xl, 498.*

Tuberculous Infection of Infants and its Prophylaxis.—The factor of heredity, either of the bacillus or of predisposition, is negligible in tuberculous infection of the infant; transmission of infection is largely within the family, particularly from mother to child, and may occur at any time after birth; and a rational scheme of prophylaxis should be developed upon the basis of this point of view. The prevailing view of the almost inexorable gravity of the disease in infancy is exaggerated; and the seriousness of the infection depends upon the infecting dose, the fatal dose in the great majority of cases being but the resultant of a series of successive infections. The disease is contracted and develops through superinfections upon the degree and duration of which the evolution of the disease depends. These superinfections may be checked, possibly too late to

prevent their causing disease, but early enough to prevent the latter from assuming a grave aspect. From experience in special wards of the Laennec Hospital in Paris, where the conditions of both mothers and infants are known, the authors are convinced that there may be formulated certain laws which govern tuberculous contagion in the infant and are extremely important for prophylaxis, as follows: 1. The younger the child, the greater the danger of a grave outcome from the tuberculous infection. 2. The next most important factor is the duration of contact with the source of infection. Of 33 infants exposed but escaping infection, the period of contact was one to fifteen days in 3; fifteen to thirty days in 13; one to two months in 3; two to three months in 9; more than three months in 5. Inversely, of 86 infants infected, there were only 5 in whom exposure was for less than one month, and 35 in whom it was between three months and one year. Indeed, it is exceptional to escape disease with an exposure of more than six months. 3. The third element is the degree of contact, this being a matter of intimacy of contact, contagiousness of the infecting individual and of precautions taken. 4. The ante-allergic period has a duration inversely proportional to the degree of contamination; the shorter the ante-allergic period the greater the dose of bacilli and the more severe the infection provoked thereby. The ante-allergic period but very rarely reaches four months. 5. The time of the survival of the infant after removal from contact is of great importance. Of 36 infants under observation and dying of tuberculosis, 30 died one month or less after separation from the infecting parent, 1 within two months, 1 within four months and 1 within five months. Upon the above principles is built up the scheme of prophylaxis in infants as carried out at the Laennec Hospital, the children being separated from tuberculous parents, not necessarily before infection, but before the development of the disease. Then are described: 1. Recruiting of infants from dispensary and maternity hospitals. 2. The clinical study to determine the disposal of the infant, whether its prognosis requires it being placed with a family group or in a hospital for treatment or further observation. 3. The *Crèche* of the Laennec Hospital, more or less recently reorganized and devoted to tuberculous children. From April 13, 1920, to November 1, 1922, there were 362 admissions and 85 deaths, of which 38 were due to tuberculous and 47 to non-tuberculous conditions. Of infants placed in the special family groups there were 103. 4. The so called *placement familial* or placement in family groups designed to meet the special infant problem of feeding. This consists in a central dispensary in a country town, equipped with a waiting room, milk room, isolation rooms and under the direction of a specially trained nurse. Children are quartered in groups within a reasonable distance from the central dispensary. Statistics of one of these centres for a period of two and one-half years, beginning April 13, 1920, cover 183 infants received. Of these, 68 had left the centre for the following reasons: reclaimed by family, 18; age limit attained, 10; transferred to preventorium, 5; returned to family on account of no further contagion, 20; departure of the family from the district with removal of the child to the country, 2; sent to hospital, 10; died, 3. There were 7 further deaths of children returned to the hospital in Paris on account of illness, a total of 10 deaths in 183 children, of which 5 were from tuberculosis and 5 from other causes. After indicating the importance of so low a death rate among children doomed under ordinary circumstances, attention is called to the remarkable health of the children who survive. A table is given covering 153 infants, of whom 115 were still in the centres on December 31, 1922. Of these, 90 retained their negative cutireaction and 63 were positive. Of the "positive" children, 25 show normal growth and condition; 29 retarded growth, and somewhat less satisfactory condition; 4 show only fair general condition and 5 are dead. Of the tuberculin-negative infants 66 showed normal growth and condition; 15 of them retarded growth, and somewhat less satisfactory general condition; 4 only fair general condition and 5 are dead. But these figures are said to convey only a poor idea of the satisfactory development of both the non-infected and the infected infants. Both groups manifested excellent resistance to epidemics of pertussis and measles.—*L'infection tuberculeuse du nourrisson et sa prophylaxie, L. Bernard and R. Debré, Ann. d. Méd., May, 1923, xiii, 392.*

Intrapleural Pressure of Fetus and Newborn.—On the basis of physiological studies, performed 80 years ago (Bernstein and Hermann), it has been maintained that the pleural space of the fetus and newborn does not have a negative pressure, such as is found in respiring adults. The question of the origin of respiration is still disputed. Agreement exists, however, on the fact that before birth there is no respiration. Pressure measurements were made on stillborn children, using exceptional precautions; and it was found that a negative pressure exists in the pleural space even before the first inspiration. In explanation of this it

is suggested that there exists an expansion tendency, due to the disproportion between the size of the chest cavity and its contents. Tracheal pressure measurements were also made, coincident with the pleural measurements, and it was found that after opening the pleural space the tracheal pressure was occasioned by the elasticity of the lung. As a result of these studies, the so called Placzek lung tests become untenable. Placzek recommended that the pleural pressure be used as an index of whether a newborn child had breathed or not. This was suggested since it was believed that the pleural pressure was not positive if the lung had not inspired.—*Studien über den Pleuradruck, H. Müller, Virchow's Arch. f. path. Anat., 1922, ccxxxviii, 157.*

Infectiousness of Tuberculosis of Infants.—Numerous studies are on record in which the time, place and manner of infection of infants with tuberculosis have been accurately determined. In the great majority of instances the source of infection has been an adult. The author records an instance of transfer of infection from a tuberculous infant to other infants in a hospital ward. Tuberculosis in infants is hard to diagnose, but the tuberculin test is a great aid and should be used in time to detect infection and isolate infected infants before contact with healthy children.—*Ueber die Infektiosität der Säuglingstuberkulose, A. Bratusch-Marrain, München. med. Wchnschr., Aug. 31, 1923, 1120.*

Hilum Lymph Node Enlargement in Tuberculous Children.—The diagnosis of tuberculosis in children is often difficult. Because the infection is commonly lymphatic rather than pulmonary, there are usually few, if any, abnormal physical findings; this is especially true of hilum involvement. Ninety children were studied. All these gave positive Pirquet reactions and showed such evidences of active tuberculosis as undernutrition, enlargement of the hilum or cervical lymph nodes, or low grade fever. None showed evidence of pulmonary tuberculosis. Roentgen ray examinations were made in each case. The physical signs adopted as criteria of hilum lymph node enlargement, not necessarily tuberculous, were interscapular dulness, whispered-voice transmission over the spine, spoken-voice transmission, D'Espine's sign, change of breath sounds, and change of percussion note over the spinous processes. Of the group of ninety, 34 showed no hilum node enlargement and 56 showed enlargement by roentgen ray or fluoroscopic examination. Of the 90 children, 67, or 70 per cent, had one or more physical signs of hilum enlargement, while only 56, or 60 per cent, showed enlargement by roentgen ray examination. Of these 67 who had one or more signs present, 59 had a positive whispered voice sign, 41 a positive spoken voice sign, 37 a positive change in respiratory sound; 35 a positive percussion note over the spine; 25 a positive D'Espine sign; and 19 showed positive interscapular dulness. Of the 34 children in whom the roentgen ray examination was negative for enlargement, 23, or 68 per cent, showed physical signs of enlargement. There were 12 of the 56, or 21 per cent, who showed enlargement by the roentgen ray but gave no physical signs of enlargement. *Conclusions*: 1. The presence of one or more of the accepted physical signs of hilum node enlargement is not absolutely indicative of actual enlargement. 2. The absence of the physical signs of hilum enlargement mentioned above does not rule out the possibility of enlargement. 3. The true D'Espine sign is not the easiest sign of hilum node enlargement, and is not of greater value than the other signs studied. 4. Interscapular dulness is a difficult sign to obtain correctly; but, when definitely present, it is the most accurate physical sign of bronchial adenopathy. 5. The whispered voice sign is the sign most frequently present, and is the easiest to obtain accurately, but is often found when there is no enlargement present. 6. The spoken voice sound is the sign next most frequently found, but it is most difficult to obtain correctly. 7. The level of the seventh cervical vertebra, which is the one usually used, is apparently too high for the limit of normal in examining for hilum node enlargement in children of school age. 8. The methods used in physical examination for determining hilum node enlargement are unsatisfactory.—*A Study of Hilum Gland Enlargement in a Group of Tuberculous Children, E. D. Anderson, J. Am. M. Ass., October 6, 1923, lxxxi, 1191.*

Causes of Surgical Tuberculosis in Children.—Children may be infected with either bovine or human bacilli but in this country at least the latter is of much more importance as an infectious agent. Children very often become infected through the lower intestinal tract, less often but frequently through the lower respiratory tract and frequently also through such portals of entry as the tonsils, which may easily transmit bacilli to the cervical lymph nodes and remain free from infection themselves. Of the series of cases reported, 24 per cent had a family history of tuberculosis; but of a similar series of poliomyelitis cases, 22 per cent also gave a history of tuberculosis in the

family. Less than 10 per cent of the cases had a history of measles, influenza or any other disease which often precedes an outbreak of tuberculosis; only 40 per cent of them (193 cases reported) gave a Pirquet reaction; 33 per cent dated onset of disease to injury; a large percentage came from homes where hygienic surroundings were bad and income low. Bone and joint infection is blood-borne from some other focus in the body, and the latter is resistant because the probability is that bacilli which are spread at the same time to other parts are usually killed and an occasional clump of bacilli, mechanically protected from the body's destructive powers, locates as an embolus in the end arteries of the joint or bone, to set up disease. Children with bone or joint tuberculosis usually do well and they only seldom have clinical tuberculosis elsewhere in the body.—*Some Etiological Factors in Surgical Tuberculosis of Childhood, W. H. Cole, J. Bone & Joint Surg., 1923, v (old series, xxi), 445.*

Diagnostic Value of the Pandy Reaction in Tuberculous Meningitis.—Eight cases of tuberculous meningitis, 5 of other forms of meningitis, 3 of encephalitis lethargica, 2 of chorea, and 8 with various lesions of the brain and spinal cord, were studied clinically and also by numerous laboratory tests on the cerebrospinal fluid. The Pandy test was uniformly positive in the cases of tuberculous meningitis, which was not true of the cases suffering from the other conditions. The discovery of a positive Pandy test in a given cerebrospinal liquid necessitates the careful ruling out of tuberculous meningitis.—*Sul valore diagnostico della reazione di Pandy nelle meningiti tubercolari dei bambini, U. Provinciali, la Pediatria, April 15, 1923, xxxi, 409.*

Diagnosis of Cattle Tuberculosis.—Different diagnostic methods were used in examining 50 cattle, the findings being checked at slaughter. The nutritional condition tells nothing about the presence or grade of tuberculosis. The presence of cough is only suspicious. Percussion with the hammer and pleximeter should be supplemented by the finger. Auscultation is a valuable aid, but is negative when tuberculosis exists without exudation into the bronchi. The upper air passages of stall cattle are, in the majority of cases, free from tuberculous secretions. In spite of the presence of open pulmonary tuberculosis, the sputum can be often free from tubercle bacilli. In the ophthalmic test a positive reaction can be obtained by an accidental or purposeful institution of a conjunctivitis. This source of error is obviated by the intrapalpebral tuberculin test which yields good results. The injection is best performed from the conjunctival side. The use of 3 cc. of a tuberculin physiological salt solution (1 to 10, according to Favero) is more satisfactory than tuberculin without the addition of salt solution.—*Beiträge zur klinischen Diagnostik der Rindertuberkulose, C. Haupt, Dissertation, Leipzig, 1922, Abstr. from Centralbl. f. d. ges. Tuberk-Forsch., July, 1922, xviii, 147.*

Physical Development in Children with Hereditary Syphilis and Tuberculosis.—Two hundred children in an orphans' home were tested by the cutaneous tuberculin and Wassermann reactions. The results are tabulated in percentages, giving the physical status of the four groups of children: immune, syphilitic, tuberculous, and syphilitic-tuberculous.

	PHYSICAL DEVELOPMENT		
	Above average	Average	Deficient
	per cent	*per cent*	*per cent*
Immune	22.3	34.4	43.3
Heredosyphilitic	21.	37.5	41.0
Tuberculous	23.3	32.0	44.7
Syphilitic-tuberculous	48.5	22.0	29.5

	CONDITION OF NUTRITION			
	Excellent	Good	Mediocre	Deficient
	per cent	*per cent*	*per cent*	*per cent*
Immune	13.4	46.2	21.0	13.4
Heredosyphilitic	4.8	29.2	44.0	22.0
Tuberculous	13.0	32.0	42.0	13.0
Syphilitic-tuberculous	32.0	27.0	27.0	14.0

Children with the latent form of syphilis or tuberculosis do not deviate much in growth from the average. Those infected with both diseases grow even better than the average; due, the author believes, to the added stimulation of vital functions in the presence of intact organs. Surroundings and food and the manner of living are of greater impor-

tance than infections as factors regulating growth and the state of nutrition.—*Lo sviluppo corporeo in rapporto all' eredoleu e all' infezione tubercolare, F. de Angelis, Pediatria, April 1, 1923, xxxi, 357.*

Tuberculosis in Horse.—An old draft horse which had had "heaves" for two years died suddenly while drawing a plow. Autopsy revealed large areas (1 to 5 cm. in diameter) of caseous and purulent material in the liver and in a greatly enlarged left kidney. The thorax was filled with blood and the left lung was ruptured from apex to base in the dorsal region. Both lungs contained numerous areas of tuberculous tissue up to two inches in diameter. The heart was greatly hypertrophied and the pericardium thickened. Such an animal is a great source of danger to an accredited herd. The horse may have been spreading bacilli ever since the "heaves" began; the "heaves," however, may have been due to emphysema.—*Tuberculosis in a Horse, R. L. Conklin, J. Am. Veterinary Med. Ass., 1923, lxiii (new series, xvi), 255.*

Review of Pathological Concepts of Tuberculosis.—Even though it is clear that in tuberculosis researches there are being considered, on the one hand, the virulence and number of infecting tubercle bacilli (with mixed or secondary infection) and, on the other hand, the disposition and constitution of the infected human body, we still are far from accurately evaluating the factors in the individual case. The four factors not only vary from case to case, but they vary for each individual case in the course of time. Tuberculosis is not only an immunobiological problem, but also from beginning to end chiefly a pathologic-anatomic one (Aschoff and Marchand), the tissue changes being primarily a matter of inflammation. A weighty contribution to the experimental and anatomic researches of the last ten years is the fact that the tubercle bacillus, even without the aid of other microörganisms, can call forth in the human body very different inflammations, depending upon qualitative and quantitative factors (Tendeloo). We are still far from differentiating the factors which cause the qualitative tissue changes. It has not been sufficiently determined in how far tuberculous infection is favored or inhibited by the development of other microörganisms. Aerogenic infection seems to be most frequent, while in childhood and infancy the intestinal route seems to predominate according to the reports of the past ten years. Birch-Hirschfeld believed the primary lung nodule to develop in the bronchial mucosa. But there may be initial subpleural or interalveolar (acinous) nodules in which an aerolymphogenous origin is most probable (Tendeloo). The primary lung nodules of children and of adults must be differentiated. According to Albrecht, Ghon, Hedren, etc., there is an irregular localization of the primary lung focus, with regular association of the regional lymph nodes in the child. In the latter there exists the danger of rapid dissemination in the body. Cornet's law of regional lymph node involvement with primary tuberculous foci not only holds true for tuberculosis but also for typhoid fever, plague and other infections (the primary complex). There are, however, observations in adults, in which the regional nodes were not involved with a primary lung nodule. This may be explained as due to the bacilli passing on through the local nodes to hilum nodes (Harbitz, Gaffky). Ghon does not agree with this. It is still disputed whether tuberculosis in the adult is an endogenous or exogenous reinfection. The origin of the giant cell is reviewed. The problem of the softening of tuberculous caseation is attributed to physicochemical changes. The constitution question is reviewed. Especially the "lymphatic" types fall prey to tuberculosis. Ranke's classification and modifications are reviewed. Retrograde infection is discussed. This critical review is primarily for the purpose of presenting to the practising physician the most important points on the pathologic-anatomic tuberculosis researches of the past ten years.—*Über den heutigen Stand der pathologisch-anatomischen Tuberkuloseforschung, G. O. E. Lignac, Centralbl. f. d. ges. Tuberk.-Forsch., March, 1923, xix, 273.*

Histology of Primary Tuberculous Foci of Lung.—Primary tuberculous lesions of the lung have been only slightly studied microscopically. The exact postmortem and microscopic reports are given on 7 cases, ranging in age from 5 months to 4½ years. The findings verify the well-known histological picture of the primary lesions. Regarding the route of infection it is believed that the lodgment takes place in the walls of the smaller bronchi, from 1 to 2 mm. in diameter. The histology of the primary lesions speaks in favor of an aerogenic infection.—*Beitrag zur Histologie des tuberkulösen Primärherdes der Lunge, A. Kebben, Virchow's Arch. f. path. Anat., 1922, ccxxxvii, 224.*

Breathing Experiments with Animals.—This is a preliminary study on the effects of breathing upon tuberculosis in animals. Thus far only normal animals have been

studied. Keeping rabbits in a closed chamber of 10 litres' cubic contents, filled with air, results in a gradual increased respiratory frequency, which gradually subsides upon removing the animal from the chamber. When, however, the animal is kept in a closed chamber containing a mixture of air and coal gas, hydrogen gas, etc., there occurs a decrease in the respiratory frequency, which gradually increases again upon returning the animal to the air. The respiratory oscillations seen might be explained as the result of increased or decreased stimulation of the respiratory centre, or the intoxication from the gas in the chamber which must be revealed by chemical study of the blood gases.—*Experiments in Deep Breathing on Animals for the Prophylactic Effects on Pulmonary Tuberculosis, Shozaburo Otabe, Sei-I-Kwai Igakuzasshi, December, 1922, xli, no. 6, Abstr. from Japan Medical World, April, 1923, iii, 87.*

Wandering Cells and Tubercle Formation.—A polemic between Baumgarten and Heiberg, in which the former maintains that it still remains to be determined whether the epithelioid cell of the tubercle originates from proliferating fixed connective tissues or from the mononuclear wandering cells.—*Wanderzellen und Tuberkelbildung, P. Baumgarten, Centralbl. f. allg. Path. u. path. Anat., April, 1922, xxxii, 393.*

Mechanism of Breath Sounds.—Two different opinions have heretofore prevailed: (1) that the specific vibration of the pulmonary tissues causes vesicular breathing, and (2) that the vibrations of the bronchial system force their specific frequency on the tissues of the lungs and chest wall, being there either weakened or strengthened according to physical conditions. To the latter process the laws of so called forced vibrations, formulated by O. Frank, should apply. This leads to the consideration of the origin and qualities of vibrations originating in the laryngobronchial system. The mechanism of percussion bears great resemblance to the beating of a drum. In each case a thin wall or membrane is struck, behind which is a medium capable of complicating the specific frequency of the wall. Heretofore, either too great importance has been ascribed to the wall for the formation of the tone, leaving to the cavity merely the function of resonator (Bushnell and the natural philosophers) or, as the majority of physicians have believed, the cavity only was considered of importance. To solve the problem, a model was devised, the parts of which could be observed singly or in combination,—a cube-shaped box with a wooden plate replacing the membrane of the drum. Tracings of the vibrations were recorded on a kymograph. At first the specific vibrations of the plate and of the cavity were registered separately, and then combined. Neither part predominated over the other in the combined tracing; in such a system, the one does not serve as a resonator to the other, but the specific vibrations of both parts are superimposed one upon the other. Normal conditions may be imitated by filling the box with a porous tissue, such as cellulose. Under such conditions two separate vibrations were distinctly registered. The model approached the pathological if filled with moist cellulose, thus corresponding to massive consolidation. In this case the registration shows only the vibration of the wall. There is no doubt that on percussion of the chest the wall and contents are ultimately associated, the specific vibration of the contents predominating by graphic registration. Over the chests of adults there is a fundamental note between G and C (from 95 to 130 vibrations a second). In fact, the same fundamental note was found on percussing exenterated lungs directly. On the other hand, completely solidified lung is mute, and percussion yields nothing but the vibration of the chest wall. The bronchial system must also be considered in the source and transmission of sound. The vocal cords can scarcely be of importance in originating the breath sounds, as Geigel and Bushnell have affirmed, for after their elimination through paralysis or through insertion of the tracheoscope the breath sounds are scarcely changed. Also, with wide gaping vocal cords breath sounds may be heard over the trachea as well as the lung when respiration is rapid enough. It is therefore suggested that the bronchial quality of breath sounds arises from the edges and corners of the tracheobronchial bifurcations. The larynx, therefore, is not the origin of their fundamental tone, but the whole tracheobronchial system takes part. Through solidified lung, laid on the trachea, one hears both voice and tracheal breathing, including high overtones. According to Bushnell, the predominance of these high overtones requires a two-fold supposition: (1) that in bronchial breathing the mouth and nasopharynx serve as resonators, and (2) that in massive consolidations the deep and medium-pitched tones are suppressed. The laws of forced vibrations are in opposition to the latter, while the former supposes a mechanism not found normally. It is simpler and more logical to consider the bronchial breathing audible over solidified tissue as a correctly propagated specific vibration of air in the bronchial system. Muller has estimated the pitch

of bronchial breathing between d^2 and d^3, and Martini has found an upper limit of 1000 vibrations a second and a lower of d^2 to e^1. Recently he has been able to define graphically the maximum resonance of the lung, and found it, in the case of men's voices, always in the pitch of the percussion sound. The specific tone of the bronchi was always found higher than that of air-bearing, sound-conducting lung. Consequently, all specific vibrations of the bronchial system must be weakened while passing through normal lung, the highest even being extinguished. The absolute pitch of tone of vesicular breathing fluctuates much more than that of bronchial breathing, being between 100 and 200 vibrations a second. These observations indicate that the specific vibrations of the lung tissue must be taken into account. One might compare the percussion note to a string which has been struck and the vesicular murmur to one suddenly strained. The tones differ in color, but their fundamental frequency is the same. Both percussion and inspiratory tension are methods of bringing the lung out of equilibrium and setting up vibrations.—*The Mechanism of Production of Breath Sounds, P. Martini, Arch. Int. Med., September, 1923, xxxii, 313.*

Motor Innervation of Diaphragm.—The motor innervation of the diaphragm in mammals is still under discussion, some observers claiming that the phrenic is the only motor nerve for the diaphragm, whereas others believe that the lowest intercostal nerves send motor branches to this muscle interposed between the chest and abdomen. In the present study, by resection of the phrenic nerve on one side, with subsequent degeneration of the same side of the diaphragm, as well as by faradic stimulation of the nerves in question, it was demonstrated that in dogs and *Macacus* the phrenic is the only motor nerve for the diaphragm. The few clinical observations and necropsy findings on man point to the same arrangement in human beings. Further clinical observations of degeneration of the diaphragm on one side, especially following the diagnostic or therapeutic phrenicotomy with exairesis (tearing out) of the peripheral stump, verified by autopsy, will settle this question also for man.—*The Phrenic as the Nerve of Motor Innervation of the Diaphragm, K. Schlaepfer, Bull. Johns Hopkins Hosp., June, 1923, xxxiv, 195.*

Influence of Costodiaphragmatic Adhesions on Respiratory Function.—The diaphragm ranks second only to the heart among muscular structures. Its piston-like action increases the vertical diameter of the thorax. Its origin from the lower six ribs leads to their fixation as it descends. Its share in respiration has been a mooted point for many years. Expansion of the lower lobes and dorsal portion of the upper lobes is admittedly dependent upon diaphragmatic contraction, and Meltzer has noted that changes in intrapleural pressure upon inspiration were first and most felt at the base. Expanding force is naturally exerted more markedly on surfaces of direct than indirect expansion, and the basal infundibula are of much greater dimensions than the apical. Attempts to estimate accurately the part played by the diaphragm in respiration have followed certain mathematical lines. Keith determined an area of 250 sq. cm. to be in contact with the lungs, so that a descent of 10 mm. would increase the thoracic space by 250 cc. Hultkrantz determined a sweep of 10 cm. between the levels of the diaphragm on forced inspiration and expiration. Litten's phenomenon clearly demonstrates the inspiratory descent of the diaphragm. The shape of its dome may be determined by observations of the changes in the subcostal angle on inspiration. The sum total of the opposed actions of the intercostals and diaphragm on the costal margins, as Hoover showed, is slightly in favor of the intercostals, so that with normal relations there should be slight outward movement of the costal margins on inspiration. Fluoroscopy is of paramount importance in studying the contour, extent and regularity of diaphragmatic movement. Roentgenograms have a more limited field in determining its form and position. Few contributions of a clinical nature have been added to our knowledge of phrenic function. Pryor's roentgenological studies showed diaphragmatic immobility in 53 out of 83 individuals who had suffered from empyema or pleurisy with effusion, and some restriction of motion in an additional 17. He concluded that a diaphragmitis with consequent infiltration, loss of elasticity and muscular atrophy, or possibly phrenic neuritis, is more apt to cause this disability than adhesions. The cases here studied were in the main the end results of thoracic wounds and empyema. The vital capacities were studied and the percentage of normal calculated, using West's standards. For the most part the diaphragm was totally immobile. The vital capacity figures range from 57.2 per cent of normal to 75.6 per cent (excluding one unusual case), with a grand average of 68.1 per cent. Pryor's conclusions of actual paralysis of the diaphragm were disproved by observations of slight movements of the costal margins. In cases of unilateral paralysis the affected

leaflet should be elevated upon inspiration because of the increased abdominal pressure, resulting in a so called 'balance movement'. This was not noted. A second group showing merely impaired mobility gave readings between 71.7 and 102.2 per cent, with an average of 87.6 per cent. The data show that costophrenic adhesions obviously constitute a considerable embarrassment to respiration. It would seem that the part of the diaphragm in deep respiration has been underestimated and that normally diaphragmatic contraction must account for at least 60 per cent of the respiratory interchange in deep breathing. Protection of the diaphragm from needless trauma and continued contact with inflammatory products will limit the occurrence of disabling adhesions. Also, early and continued breathing exercises are advised in all cases of pleural inflammation involving the diaphragm.—*Costodiaphragmatic Adhesions and Their Influence on the Respiratory Function, W. S. Middleton, Amer. J. M. Sci., August, 1923, clxvi, 222.*

Vital Capacity of the Chinese.—During routine examination of the students of the College of Yale in China and city schools, also of patients in the Hunan Yale Hospital, it was found that the vital capacity of the Chinese fell considerably below the standards adopted for Americans. Investigations were therefore undertaken to determine a normal standard for the Chinese, and to study the effect of various occupations. Body surface was determined from height and weight by the DuBois chart. Records of over 600 persons were taken, and of these, 500, in ten groups, were chosen for analysis. Of these 500 persons, 425 were men and 75 women. The results showed a general average of 2.02 litres per square metre of body surface for men, and 1.53 for women; for convenience the flat figures of 2 and 1.5 were adopted as the normal standard, as compared with the American standards of 2.5 and 2, respectively. About 20 per cent of both men and women were below 90 per cent of the Chinese normal, and 80 per cent of men and 85 per cent of women below 90 per cent of American normal standards. Individual deviations were wide, as shown by the fact that only 42 per cent of men and 31 per cent of women were within plus or minus 10 per cent of the standards. When ratios to height were calculated, they showed an average of 19.5 cc. per cm. for men and 14.3 for women, and for convenience flat figures of 19 and 14 were adopted. These are compared with the Western standards of 25 cc. per cm. for men and 20 for women. Again the individual deviations were wide. A comparison of the averages of occupational groups shows some differences which seem to be greater than the normal margins of error. The soldiers have the lowest vital capacity, with an average surface ratio of 0.13 below the general average; the students the highest, with 0.16 above. Shop clerks have a low average; glass blowers the highest among the laborers, although lower than that of the students. The students as a whole had been fairly active in sports. This seems to confirm the doubt raised by Hewlett and Jackson that standards based on a picked group, as college students, are too high for the general public. The figures obtained here for women are lower than those for school children from 6 to 16 years of age in New York City. For comparison, a group of foreigners gave an average surface ratio of vital capacity of 2.39, which is slightly lower than West's standard. The height ratio of 25.1 equalled the American standard. As the measurements were taken under the same conditions as the Chinese, and several overweight and quite sedentary persons were included, a racial factor is strongly suggested. Fitting in with this is the fact that the figures for negro children in the United States are less than for white children of the same age. It is possible that figures obtained for Chinese in Central China will not hold true for the whole country, since there is great difference in the stature and physical development of different races of Chinese.—*The Vital Capacity of the Chinese; An Occupational Study, J. H. Foster and P. L. Hirsh, Arch. Int. Med., September 15, 1923, xxxii, 335.*

Pulmonary Tuberculosis and Vegetative Nervous System.—Rockemann has shown that the vasomotor irritability of the skin is a prominent factor in the allergic reaction. With adrenalin, inflammation and swelling of the injection site were either abolished or weakened, even though the dose was increased tenfold. Pilocarpin caused a flareup of old cutaneous and intracutaneous, as well as Pirquet, reactions. Temperature reactions were also modified by adrenalin, so that, in spite of increased tuberculin dosage, a rise in temperature did not occur. This was true of a distinct group of cases, but not all of them. Eppinger and Hess have determined that the sympathetic and parasympathetic poisons are antagonistic "in that almost all persons who react markedly to atropin and pilocarpin are not susceptible to adrenalin" and vice versa. On this basis rests the conception of vagotony and sympatheticotony. Sympathetic irritation with adrenalin, in the tuberculous, inhibits the local inflammatory reaction of

the skin, as well as the rise in temperature, after the subcutaneous injection of otherwise pyrogenic doses of tuberculin; self evidently, however, only in such cases as possess a definite grade of irritability of the sympathetic nervous system. Without doubt, the exudative forms of pulmonary tuberculosis, with an excess of parasympathetic irritative circumstances, are bound up with depressed sympathetic nervous systems, while the indurative forms are associated with a normal or increased irritability of the sympathetic nervous system. Is the development of the various types of tuberculosis symptomatic of the constitutionally present sympatheticotonic or vagotonic condition of the vegetative nervous system or are their irritative conditions an associated symptom of the disease? Since all causes of diseases have specific general actions and also a sort of affinity to certain cell systems, it could be supposed that the affinity of the tubercle bacillus is to the vegetative nervous system. Thus, the vasomotor irritation of primary, inflammatory lesions could spread directly by the vegetative nervous system over the entire body, modified and changed by the individuality of the causative tubercle toxin. Possibly vagotony and tuberculosis have opposite favoring circumstances, upon which a sympathetic irritation can act in a definite manner. Probably tuberculin can, therefore, only be used when the irritability of the sympathetic is great enough, so that the body will be favorably influenced, which we see incorporated in the favorable proliferative forms of tuberculosis. Thus, the clinical grouping of the individual cases into the main groups of indurative and exudative forms of pulmonary tuberculosis require a separation into sympatheticotonic and normally irritable on the one hand, and the vagotonic cases on the other; thus indicating the close relationship between tuberculosis and the vegetative nervous system.—*Lungentuberkulose und vegetatives Nervensystem, E. Guth, Beitr. z. Klin. d. Tuberk., September, 1922, liii, 94.*

Normal Pleural Fluid.—Normal pleural fluid was tested. The fibrin separation, if abundant, rapid and of gelatinous appearance, indicates a pleural exudation. In negative cases the Rivalta reaction should be tried, and if this is negative the fluid is an effusion. If positive or doubtful, 0.2 cc. should be mixed with 7.8 cc. of distilled water and tested for albumen according to Suyeyoski, and if this reveals 2.5 to 3 per cent, or 0.6 to 0.8 pro mille in 1/40th dilution, it is normal pleural fluid. Cardiac and nephritic conditions should first be excluded. —*On the Pleural Cavity Fluid in Normal Persons, Kyukei Ohkubo, Tohoku Igakkwai Zasshi, October, 1922, vi, nos. 3 and 4, Abstr. from Japan Medical World, February, 1923, iii, 34.*

Physiological Effects of High Temperatures and Humidities.—Miners and others, subjected to extreme conditions of heat and humidity, were investigated during and after exposures. At temperatures of from 91.5° to 100°F. in saturated still air the body temperature (at rest) was raised as much as 3° in an hour, the pulse rate increased in various subjects to a range from 104 to 170 beats per minute, profuse sweating occurred and marked weakness and dizziness ensued. Similar but much less marked signs and symptoms occurred when temperature and humidity conditions remained unchanged but when air was kept in motion. When air was saturated and the temperature stood at 98.6° to 100°F. no beneficial effects followed the moving of the air, even at high velocities.—*Physiological Effects of High Temperatures and Humidities with and without Air Movement, R. R. Sayers and D. Harrington, Public Health Reports, U. S. Public Health Service, July 20, 1923, xxxviii, 1616.*

Passive Hyperemia of Liver and Tubercle Formation.—It has been frequently observed that patients with a passive congestion in the lung rarely develop clinical evidence of tuberculosis. Passive congestion in the lungs may result from a variety of clinical conditions. With a weakened heart muscle, a diminished circulatory force may cause lung alterations which vary from slight passive congestion to structural changes and edema. In mitral stenosis the pulmonary changes are marked, and it is in this particular type of case that the fibrotic changes are most likely to appear in pulmonary tuberculosis. On the other hand, bronchiectasis, syphilis, actinomycosis, cancer of the lungs and chronic pneumonia have been mentioned as predisposing to phthisis. The relation of pulmonary emphysema and asthma to pulmonary tuberculosis is of interest. The reasons why these offer some protection against tuberculosis are not clear. The atrophic condition of the pulmonary parenchyma, the slowness of the inspiratory current or the presence of venous hyperemia, especially in emphysema, may be the determining factor. On the other hand, all forms of congenital heart disease predispose to tuberculosis, particularly stenosis of the pulmonary artery. Although the obstruction to the lesser circulation and the resulting congestion and plethora have been offered as an explanation for the antagonism between

mitral stenosis and phthisis, it must be borne in mind that in compensated mitral stenosis the lungs do not have a larger quantity of blood than normally; it is only with the onset of decompensation that the pressure is lowered and the blood stream is slowed, thus favoring a larger quantity of blood in the lungs. The favorable results reported with various forms of heliotherapy have probably been due to the congestion resulting in the local and remote areas. The production of congestion has been greatly emphasized by Bier in his application of passive hyperemia to surgical conditions. As there is no knowledge of the effect of passive congestion in the other organs with relation to the development of tuberculosis, experiments were undertaken to ascertain the effect of passive congestion of the liver on tubercle formation. For this purpose rabbits were used and passive congestion, primarily of the lungs and secondarily of the abdominal viscera, was obtained by repeated intravenous injections of small quantities of oil. All rabbits were inoculated with bovine tubercle bacilli suspended in oil, either via the portal vein or a branch of the mesenteric. One group of animals received the oil before and after inoculation, another after inoculation, and a third control group received no oil at all. All animals were killed at the end of six weeks for macroscopic and microscopc examination. No striking differences were noted grossly between the treated and control animals as to the quantitative distribution or size of tubercles in the liver. The histological examination of the livers showed a greater deposit of fibrous tissue around and within the tubercles in animals that received oil before and after being injected with tubercle bacilli, less in the animals that received oil after the injection of tubercle bacilli, and least in the control animals. The lungs of the last, however, contained more tubercles than the lungs of the animals receiving oil after the injection of tubercle bacilli. The lungs of the rabbits receiving oil prior to tubercle bacilli injection were relatively free from tubercles.—*The Effect of Passive Hyperemia of the Liver on Tubercle Formation, S. A. Levinson and W. F. Petersen, J. Am. M. Ass., September 1, 1923, lxxxi, 273.*

Lead Absorption by Upper Respiratory Passages.—In tracheotomized animals, with ligation of the esophagus and the trachea cephalward to the cannula, finely powdered lead carbonate dust was sprayed into the nose with an atomizer. The animals were given saline and glucose solutions intraperitoneally, but all died within thirty-six hours. At autopsy the ligatures were carefully examined, to find whether any absorption may have taken place by way of the lower trachea and lungs or the intestinal tract. Analyses of all tissues showed high percentages of lead in the skeleton, some lead in the muscles, liver and other organs and only a faint trace in the lungs, trachea and esophagus. Absorption occurred through the mucous membranes of the upper respiratory tract.—*Lead Studies: VI. Absorption of Lead by the Upper Respiratory Passages, H. L. Blumgart, J. Industr. Hyg., 1923, v, 153.*

Silica Inhalation and Tuberculosis.—Dusts are breathed into the lungs and are there either dissolved, eliminated in the sputum, or retained. The retained particles are mobilized toward the periphery of the lungs and later along lymphatics throughout the lungs. In each situation they initiate a fibrosing process which may become extreme and may block lymph drainage. Coal and lime dust are harmless; silica is very harmful. Symptoms in silicosis are sneezing and coughing (early), dyspnea, hemorrhage (occasionally fatal), and pain in the side. Usually there are no fever, night sweats or loss of weight and but few constitutional symptoms until late. Signs gradually become more like those of tuberculosis and this complication ensues in a large percentage of cases. Sputum examinations for tubercle bacilli should be frequently made. X-ray examination shows progressive lung fibrosis, at first diffuse; later, this becomes nodular and spotty and, finally, consolidated. The process is bilateral and shadows spread from the hilum toward the base. Much statistical evidence points to the damaging influence of silica, and although tuberculosis is an appallingly common complication, many people die from silicosis alone. When the complication does occur, the bacilli may have been present in the centre of the "silicotic nodule" for years and may have been latent until ulceration of the nodule released them and gave them an opportunity to spread. The term "phthisis" is confusing and should not be used.—*The Dusted Lung with Special Reference to the Inhalation of Silica Dust (SiO_2) and Its Relation to Pulmonary Tuberculosis, B. S. Nicholson, J. Industr. Hyg., October, 1923, v, 220.*

Tuberculosis in Rabbits Following Splenectomy.—It has been found that if a rabbit be splenectomized and injected intravenously with colloidal carbon a week or so later, the greater part of this carbon will be taken up by the pulmonary endothelium, which shows not only an increased ability

for phagocytosis, but also proliferative activity. With this in mind it was considered important to know what effect splenectomy would have on the distribution of microörganisms subsequently introduced into the blood stream. The tubercle bacillus calls forth a marked endothelial reaction and is frequently found in the circulation under conditions arising spontaneously after the rupture of a tubercle into a vessel. What effect would splenectomy have upon the distribution of the bacterium in experimental general miliary tuberculosis? Would the lesions produced differ from those observed in control rabbits? In order to answer these questions experiments were done which resulted in the following conclusions: 1. Splenectomy in rabbits, followed by the intravenous injection of tubercle bacilli, produced a changed distribution of these bacilli and of the lesions they cause. 2. The pulmonary lesions are fewer, more discrete, exhibit a large number of polymorphonuclear leucocytes, and contain, as a rule, more tubercle bacilli than do those of controls. 3. The lesions in the liver are far more numerous and destructive in the splenectomized than in the control animals. 4. The tubercles produced in the kidney do not show so marked a difference between the two groups as is noted in the lung and liver, but they are fewer and less well developed in the kidneys of the splenectomized animals. 5. The course of the disease is not affected materially by splenectomy; if anything it is rendered slightly more rapid; although the lung is less affected, the liver is so extensively invaded as to offset all the advantage that may have been gained by the decreased pulmonary involvement.—*Studies in Endothelial Reactions, viii. Changes in the Distribution of Tubercle Bacilli and Tubercles in the Organs of Rabbits Following Splenectomy, N. C. Foot, J. Exper. Med., September, 1923, xxxviii, 263.*

Formula of Resistance Against Tuberculosis.—If the measure of resistance in tuberculosis be expressed mathematically, its formula is $R = \frac{dr}{di}$, R being the power of resistance, dr the reaction phenomena in the body and di the infection. To determine R, patients (11 of them) were given injections of 0.1 mgm. tuberculin per 60 kg. body weight and the leucocyte picture determined on the same day, the following and the second day. By comparison of the findings before and after the tuberculin injection it should be possible to determine mathematically the resistance of the body. In spite of the fact that apparently infallible staining methods were used, the formula dependent upon counting the various leucocyte forms and with regard for the Arneth results did not work out especially convincingly. Reaction to tuberculin and resistance are evidently not identical.—*De la mesure de la résistance de l'organisme dans la tuberculose, F. Trabuc, Dissertation, Montpellier, 1922, Abstr. from Centralbl. f. d. ges. Tuberk-Forsch., April, 1923, xix, 412.*

Tuberculin Reaction.—After producing an inflammation with sulphur ointment of the skin of one arm, its influence upon the course of a traumatic reaction and the tuberculin reaction was studied. The traumatic reaction was thus accentuated while the Pirquet reaction was accentuated only in some cases but in others it was diminished; a more rapid course of the reaction was also noticed. The accentuation occurred when the preliminary treatment increased vasomotor irritability; if, as a result of this increased irritability, there resulted coincidently an increase in the circulation,which washed away the irritating substances of the tuberculin reaction, then the Pirquet reaction was diminished. Thus the reaction became independent of the threshold action of the sulphur ointment as well as the bodily constitution. The sensitization of the skin by sulphur ointment is also to be attributed to an increase of its nonspecific reactivity, in which the measure is the vasomotor irritability. Aside from the nonspecific reactivity, there are two other factors of significance in the outcome of the Pirquet reaction, namely, a direct tuberculin action, and an "immunobiological" component. The direct tuberculin action is distinct, since the treated arm, that of increased irritability of the vasomotor apparatus, reveals, after tuberculin is dropped on the lesions, an erythema which is more marked than that elicited by the traumatic lesions alone. Since this effect is not at all, or only slightly, obtained in the nontreated arm, this would indicate that the vasomotor irritability is to a certain extent involved. This hyperemic action of tuberculin is considered of vasomotor type, probably a dilator irritation and probably primary, exclusive of an immunobiological process, since it occurs immediately. In how far the vasomotor reaction is associated with the later inflammatory reaction is difficult to state.—*Untersuchungen über die Tuberkulinreaktion, W. Röckemann, Beitr. z. Klin. d. Tuberk., September, 1922, liii, 37.*

Tuberculin Reaction.—The disintegration products of proteins, lipoids and fats, which arise from the fermentative decomposition of necrotic tissues, the inflammatory

products in the tuberculous areas and the bacterial bodies, serve to change the tissues or sensitize them. They are included under the name of sensitizing bodies. Their origin is attributable to the relation between the body and the living bacilli. On the other hand, the cells and cell complexes of the body are influenced by the circulating tuberculin. Decisive for the symptoms is the reactivity of the body, as a result of constitution, disposition and general condition. It is also of significance whether the poison threshold is reached or exceeded. The tuberculin inflammations are to be divided into tissue-destructive and tissue-reparative. Depending on this relation, there is progression or retrogression of the disease. The cells in the neighborhood of a tuberculous lesion are especially tuberculin-sensitive, since the sensitizing substances are concentrated in this vicinity. Here the toxin threshold is easily attained, while with less susceptible cells larger toxin amounts are essential to cause a reaction. The sensitivity of a lesion is dependent upon the concentration of sensitizing material, and the sensitizing is proportionate to the activity of the newly developed tuberculosis. Healing in the strict sense can only be spoken of when the tuberculous lesion is completely walled off and sensitization is at a standstill, that is, when tuberculin injections produce no more reaction. Persistent toxin-sensitiveness, in the absence of general and local symptoms, indicates an arrest which may be considered as healing.—*Das Wesen der tuberkulinreaktion vom Gesichtspunkte allgemein-pathologischer und pathologisch-anatomischer Grundlagen der Organtuberkulose, A. Winkler, Beitr. z. Klin. d. Tuberk., September, 1922, liii, 51.*

Active Substance in Tuberculin.—Comparative tests with vital tuberculin and extracts therefrom with water, alkali or acids at 37°–80°, revealed that none of the latter preparations had a more marked action than the original (tested upon tuberculin susceptible people). Treatment with distilled water had a destructive influence; alkali or acid brought the greater part into solution out of the protoplasm, but in spite of this the action of these solutions was less than that of vital tuberculin. The active substances pass through a Berkefeld filter, while dialyzing thimbles retain the greater part. The virulence of the cultures is of great significance for the amount of tuberculin obtained. The tuberculin-active substances do not combine with the body cells or body fluids and there develop from them no new toxic substances which occasion the inflammatory reaction. The tuberculin reaction is more or less a physicochemical change. Under the influence of the living virulent tubercle bacillus, but not by killed or avirulent bacilli, the cells of the body are disbalanced and become allergic; as soon as these allergic cells are brought in further contact with tubercle bacillus products they are further disbalanced and become inflamed, even to the point of necrosis.—*Über die Natur der in den Tuberkulinen wirksamen Stoffe, H. Selter and E. Tancré, Beitr. z. Klin. d. Tuberk., September, 1922, lii, 82.*

Tuberculin Hypersensitiveness from Dead Tubercle Bacilli.—Living tubercle bacilli were made into a suspension with physiological salt solution, killed by heat (two hours on the water-bath at boiling temperature), thoroughly shaken for several hours and inoculated intraperitoneally into 90 guinea pigs in doses of $\frac{1}{16}$ to $\frac{1}{2}$ cc. No ill effects appeared after inoculation. Sensitiveness to tuberculin was determined by constitutional reaction after intraperitoneal injections. Sensitiveness appeared about two weeks after inoculation, was marked from three to seven weeks, when the height of fatal reactions occurred and continued undiminished until about the eighteenth week. Between this and the twenty-eighth week there was a marked decline. Animals reacted to intraperitoneal inoculations of dead tubercle bacilli with thickening of the omentum and the formation of a few tubercles in the omentum, spleen, liver and peritoneum.—*Tuberculin Sensitiveness Caused by Dead Tubercle Bacilli, A. B. Crawford, J. Am. Vet. Med. Assoc., November, 1923, lxiv, n. s. xvii, 228.*

Neutralizing Tuberculin.—By immunizing rabbits and guinea pigs with experimental chronic tuberculosis to old tuberculin, in which the Pirquet-reacting substance had been precipitated by 3 volumes of saturated ammonium sulphate solution, the author obtained a serum possessing anticutaneous reacting substances. In normal animals the production of the serum with anticutaneous reacting substances was not so marked as in the tuberculous animals. A mixture of *anticutin* serum and tuberculin, incubated for two hours, did not prevent a tuberculin death of the animal; but if the *anticutin* serum was injected 5 to 6 hours prior to the intravenous injection of the tuberculin (in a dose of 0.3 cc. per 100 gm. body weight), the animal was protected against four lethal doses of tuberculin. These phenomena are considered similar to the nonspecific antisensibilization of Weyl and others; and the *anticutin* action is not as simple as the action of toxin and antitoxin

in diphtheria and tetanus, but may be due to the lessened sensitivity of the tuberculous guinea pig tissue to tuberculin.—*On the So Called Neutralizing Serum of Tuberculin Reactive Substances, Korewo Yosbizawa, Jikken Igaku Zasshi, January, 1923, vii, no. 1, Abstr. from Japan Medical World, July, 1923, iii, 167.*

Influence of Serum upon Tuberculin in Tuberculosis of Eye.—Jadasohn's finding, that admixture of active serum with tuberculin promptly weakens tuberculin in its effect, does not invariably hold in its application in cases of eye tuberculosis. The variation noted may be of prognostic value. Römer and vom Hofe find that most cases of keratoconjunctival scrofula respond to a mixture of 0.4 cc. serum and 0.1 cc. of 1 to 100 albumose-free tuberculin with less local inflammation than to the same dose of tuberculin in 0.4 cc. salt solution, confirming Jadasohn to this extent. There are exceptions, however, which are as a rule especially severe cases. Much investigation is still required, however, before this finding is established as a law for prognosis, especially in view of Jadasohn's finding that prolonged contact with serum strengthens the action of the tuberculin.—*Ueber den Einfluss des aktiven Serums auf die intrakutane Tuberculinreaktion bei Fällen von Augentuberkulose, Römer and K. vom Hofe, München. med. Wchnschr., August 3, 1923, 1014.*

Effect of Tuberculin on Lymph Flow in Dogs.—Since its introduction the basis of the action of tuberculin has centered about the idea that in some way it had value in increasing the "antibody resistance." Yet we now know that its value cannot be due to the antibody mechanism. Increase in antibody concentration in the blood need bear no relation whatever to either clinical improvement or retrogression. The authors are of the opinion that the therapeutic effects of tuberculin are dependent on alterations in the endothelium, not only of the vascular system, but on the itinerant endothelium that plays so large a rôle in the tubercle itself; alterations that bring about change in the water balance of the tissue and the fluids permeating the tubercle. It has long been known that the intravenous injection of tuberculin was followed by some lymphagogue effects: the volume of the lymph stream and the solids of the lymph increased. Inasmuch as this phase of the effect of tuberculin has heretofore received but little attention, a number of experiments were carried out on dogs in which endothelial permeability was studied through methods of lymph analysis. By means of thoracic duct cannulas, the rate of flow of the lymph, a differential estimation of its proteins and the permeability of the endothelium to injected (via the blood) hemoglobin could be studied. In normal dogs large doses of tuberculin intravenously were found to produce an endothelial response characterized largely by an increase in cell permeability, as indicated by a marked increase in phosphates and moderate increase in lymph flow, and an increase in the large molecular aggregates at the expense of the smaller protein fragments. But while this was taking place the volume of the lymph and the sugar level diminished. It would seem that both an increase and a decrease in cell permeability were taking place simultaneously in different cell groups or organs. Smaller doses of tuberculin resulted in a transient stimulation of the endothelium, followed by a relatively prolonged impermeability, because hemoglobin injected during this time is delayed in its passage to the lymphatics. It is obvious that tuberculin cannot be considered as an indifferent substance for the normal body, as has so frequently been stated in the literature of tuberculosis. Tuberculous animals offer additional complications, for their sensitized endothelium reacts with greater intensity and speed. The direction of the reaction is, however, the same as in the normal animal, the difference lying in the relative response. In tuberculosis there are lesions scattered throughout the body, some of which may be fixed and relatively impermeable; others may be recent, consisting of relatively loose aggregates of newly formed cells with bacteria and toxic masses of necrotic debris at the centre, the whole structure relatively permeable and particularly susceptible to alterations in permeability because of at least four factors: (1) the cells are all young, (2) many are of endothelial origin, (3) they are all more or less constantly irritated by the toxic material from the necrotic focus, and (4) they are specifically sensitized. Tuberculin, injected into a tuberculous animal, besides producing changes in the vascular endothelium, effects changes in the permeability of the tubercle. These latter may be initiated immediately or they may take place at a considerable time after the injection. The changes may be transient, followed by a prolonged period of relative impermeability, or severe, with increased and prolonged permeability and with the liberation of much toxic material from the focus, or, finally, so great that sufficient toxic material will be liberated to kill the animal very promptly after the injection. The effect of the administration of tuberculin to tuberculous dogs was found to be more or less along the lines of the above hypothesis. Very small

doses resulted in a transient stimulation of the endothelium followed by a recovery, during which time the endothelium is relatively less permeable. In some animals there was a secondary or later increase in permeability which would correspond to the effect of a liberation of toxic material from the foci of infection.—*Studies on Endothelial Permeability. VI. Alterations of the Thoracic Lymph Following the Injection of Old Tuberculin in Normal and Tuberculous Dogs, W. F. Petersen, R. H. Jaffe, S. A. Levinson and T. P. Hughes, J. Immunol., September, 1923, viii, 387.*

X-ray Diagnosis of Pulmonary Tuberculosis.—Fourteen years' experience at the Brompton Chest Hospital has made the following impressions: 1. Radiographic examination is not a short cut to diagnosis in a disease which, like tuberculosis, is a clinical disease. 2. Recent infection in an old lesion is difficult to determine. 3. Team work is necessary if radiology is to become, as it should, one of the most essential elements in early diagnosis. 4. There is a need for a closer correlation of X-ray images and postmortem findings. 5. Careful attention to technique is of first importance. 6. The size, position and behavior of the heart is of much greater importance, not only in diagnosis but also in prognosis, than has hitherto been admitted. 7. The presence of emphysema is a great hindrance to physical examination. Regarding technique, it is possible, by careless adjustment of relationship between the central ray of the focus tube and the photographic plate, to obtain great distortion of chest shadows. In making serial records at various intervals it is especially necessary to reproduce technique accurately. As a routine, the patient lies on the back and an arbitrary point is taken, say the centre of the sternum at the level of the third costal cartilage, upon which, by means of a movable plomb bob, the central ray of the tube can be read off on a corresponding scale along which the tube carrier travels. The small, feebly acting heart, lying almost vertically in the thorax, indicates an unfavorable prognosis when present in association with pulmonary tuberculosis. Such a heart is probably the subject of a toxemia which causes damage of the myocardium; it is not to be confused with the "hanging heart" of Wenckebach and does not form a part of a general visceroptosis. When emphysema is present the X-ray is of special value in showing the true extent and nature of pulmonary tuberculosis, because physical signs here are misleading. The fact that emphysema may be present should, alone, convince one of the importance of X-ray control prior to and during the production of artificial pneumothorax. It is unfair both to the doctor and the patient in any institution that they should be deprived in the present day of any ancillary aids.—*Some Points in the X-ray Diagnosis of Pulmonary Tuberculosis, S. Melville, Tubercle, June, 1923, iv, 399.*

Complement Fixation in Tuberculosis.—In this article the results obtained with two different antigens, namely Wang's and Besredka's, are compared. The dosage was the lowest dilution which was devoid of anticomplementary action. Thus Wang could be used at 1 in 40; Besredka's at 1 in 20. The complement was obtained from pooled serums and the preliminary titration omitted, and the tests were made with a constant dose of 0.5 cc. of 1 in 10 serum. Fifty-seven cases of bone and joint tuberculosis in children were tested with these two antigens, the Wang giving 40.7 per cent positives and the Besredka 64.9 per cent positives. In every instance in which the Wang antigen gave a positive the Besredka was also positive. The cerebrospinal fluid from 17 cases of tuberculous meningitis gave 70 per cent positives with the Wang and 35 per cent positives with the Besredka antigen. In every instance in which the latter was positive, the former was also positive. However, with a similar number of control cerebrospinal fluids from nontuberculous cases the Wang method showed 35 per cent positives whereas the Besredka gave only 12.5 per cent. Apparently the Wang antigen is liable to give more fallacious reactions with cerebrospinal fluid than the Besredka. A number of cases of bone and joint tuberculosis in children were studied with regard to the prognostic value of the complement-fixation test, using the above two antigens. Apparently a positive reaction in a case of active tuberculosis is more favorable, as regards prognosis, than a negative reaction, but when there are no signs of active tuberculosis a negative result points to a healed tuberculosis. A negative followed by a positive reaction indicates that improvement is setting in. However, the author does not believe that the indications furnished in this work could have been of much value to the clinician as regards prognosis and concludes that complement-fixation tests do not afford a reliable means of clinical diagnosis in bone and joint tuberculosis. A positive result does not necessarily mean a definite tuberculous infection, although probably the number of such false diagnostic reactions is not large.—*Complement Fixation Tests and Tuberculosis, A. Sellers, Brit. M. J., September 22, 1923, no. 3273, 497.*

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